

WHAT IS CLAIMED IS:

1. An magnetic-field-generating apparatus comprising permanent magnet segments in the number of N, wherein N is an even number of 4 or more, arranged to form a ring-shaped magnetic circuit having a center hole;  
5 adjacent permanent magnet segments having such different magnetization directions that their magnetization directions successively change along a circumferential direction of said magnetic circuit; a basic magnetization phase angle  $\theta$  between the magnetization directions of said adjacent permanent magnet segments being  $720/N$  ( $^{\circ}$ ); and a magnetization direction  
10 of at least one permanent magnet segment in an essential unit obtained by circumferentially dividing said ring to 1/4 being deviated from said basic magnetization phase angle  $\theta$  by such a deviating angle that a uniform magnetic flux flows in one direction along a diameter of said center hole.
2. The magnetic-field-generating apparatus according to claim 1,  
15 wherein said permanent magnet segments are arranged with a predetermined gap between the adjacent ones.
3. The magnetic-field-generating apparatus according to claim 1, wherein said ring is constituted by four essential units in the first to fourth quadrants, with magnetization directions successively changing clockwise  
20 in the first and third quadrants, and counterclockwise in the second and fourth quadrants.
4. The magnetic-field-generating apparatus according to claim 1, wherein the magnetization direction of a permanent magnet segment arranged at about  $45^{\circ}$  is deviated from said basic magnetization phase angle  
25  $\theta$  in each essential unit.
5. The magnetic-field-generating apparatus according to claim 1, wherein said deviating angle is  $15^{\circ}$  or less.
6. The magnetic-field-generating apparatus according to claim 1,

wherein the number N of said permanent magnet segments is an even number of 8 to 20.

7. The magnetic-field-generating apparatus according to claim 6, wherein the number N of said permanent magnet segments is 12.

5 8. The magnetic-field-generating apparatus according to claim 1, wherein said magnetic field parallelness at least at about 45° is within  $\pm 1^\circ$  within 50 to 70% from the center of said hole in a substantially entire axial region of said magnetic circuit.

9. A magnetic field orientation apparatus comprising the  
10 magnetic-field-generating apparatus recited in claim 1, and a heat treatment apparatus disposed in the hole of said magnetic-field-generating apparatus, said heat treatment apparatus comprising a cooling means, a heating means, and a means for holding articles to be heat-treated in this order from outside.

15 10. A magnetic field orientation apparatus comprising the magnetic-field-generating apparatus recited in claim 1 around an magnetic orientation die for producing permanent magnets.